Project: ‘Village Communication Network’ (Control Number:-ACO18011212362)

**The major objectives of this project as laid out in the proposal are:**

To provide broadband connection to a rural area from the Fiber point is typically upto 2 Km radius area. In rural area this central node needs to run on low power to make it economical. Effective outdoor WiFi solution using license exempt bands 2.4 GHz & 5 GHz can be the most cost effective solution. WiFi Radios are inexpensive and low power. This makes it viable to run on solar power.

The conventional indoor WiFi chipsets are not designed to handle multipath propagation, interference and suffer from limitations in rage and capacity. These chipsets use CSMA/CA MAC protocol (DCF) which is inadequate for high speed, multi hop guaranteed data delivery. Many attempts have been made to make WiFi mesh as the last mile access option but it failed due to these reasons.

As part of this project, WiFi technology with beam forming and TDMA based MAC with existing 802.11n chipset can be developed and field tested to provide cost effective high-performance broadband last mile connectivity in rural area.

**Time & cost of the Project**

Duration of this project: 2 years

Participation: TCOE IIT Madras and TCOE IIT Bombay

TCOE IITM and TCOE IIT Bombay require Rs. 2 Crores (for the 2 years project duration)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | First Year  IITM IITB | | Second Year  IITM IITB | | Total  IITM IITB | |
| Human Resources | 25 | 25 | 25 | 25 | 50 | 50 |
| Travel and Institute overhead | 4 | 4 | 6 | 6 | 10 | 10 |
| Hardware Platform and Test bed equipments | 20 |  | 10 |  | 30 |  |
| Software and Test tools |  | 15 |  | 15 |  | 30 |
| Field Trials |  |  | 10 | 10 | 10 | 10 |
| **Total** |  | |  | | **100** | **100** |

Note All the Figures are in Lakhs

Status Update Report as of March 2013

**Lead: Ms. Jyoti Purohit**

* The chipsets from different manufacturers for WiFI 802.11 b/g/n were evaluated for the Design
* Design based on Atheroes 922x series IC is identified as a Hardware platform which supports 802.11 b/g/n
* The MAC protocol was modified to make changes to accommodate TDMA based design.
* Power Consumption for the router evaluation
* The TDMA MAC protocol software was tested for different types of traffic like UDP, TCP.
* Multi- hop configuration tested for various traffic types
* Antennas with different gains and types like directional and omni directional tested for data rate and throughput performance.
* Analysis on interference to is being conducted
* Percentage of packet loss under different field scenario is tested.

**Following Features are being designed/ implemented in the TDMA MAC**

* Flexible interface with dynamic routing including the client suggested optimal path
* Multi-channel implementation with full-duplex communication for increasing the throughput.
* Acknowledgement sending
* Dynamic scheduling
* Fragmentation and re-assembly.
* SIP client porting in Aakash.
* Network Management feature

The software features are being implemented with co ordination with IIT Bombay (Mr. Abhay Karandikar).

Status of Funding & Expenditure (as of March 2013)

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Title** | **Approved**  (In Lakhs) | **Received**  (In Lakhs) | **Spent**  (In Lakhs) |
| Village Communication network leveraging on Fiber to village | 100 | 30 | 14.52 |